SC 21

21st Century Surface Combatant

National Security Industrial Association (NSIA) Briefing

February 7, 1997

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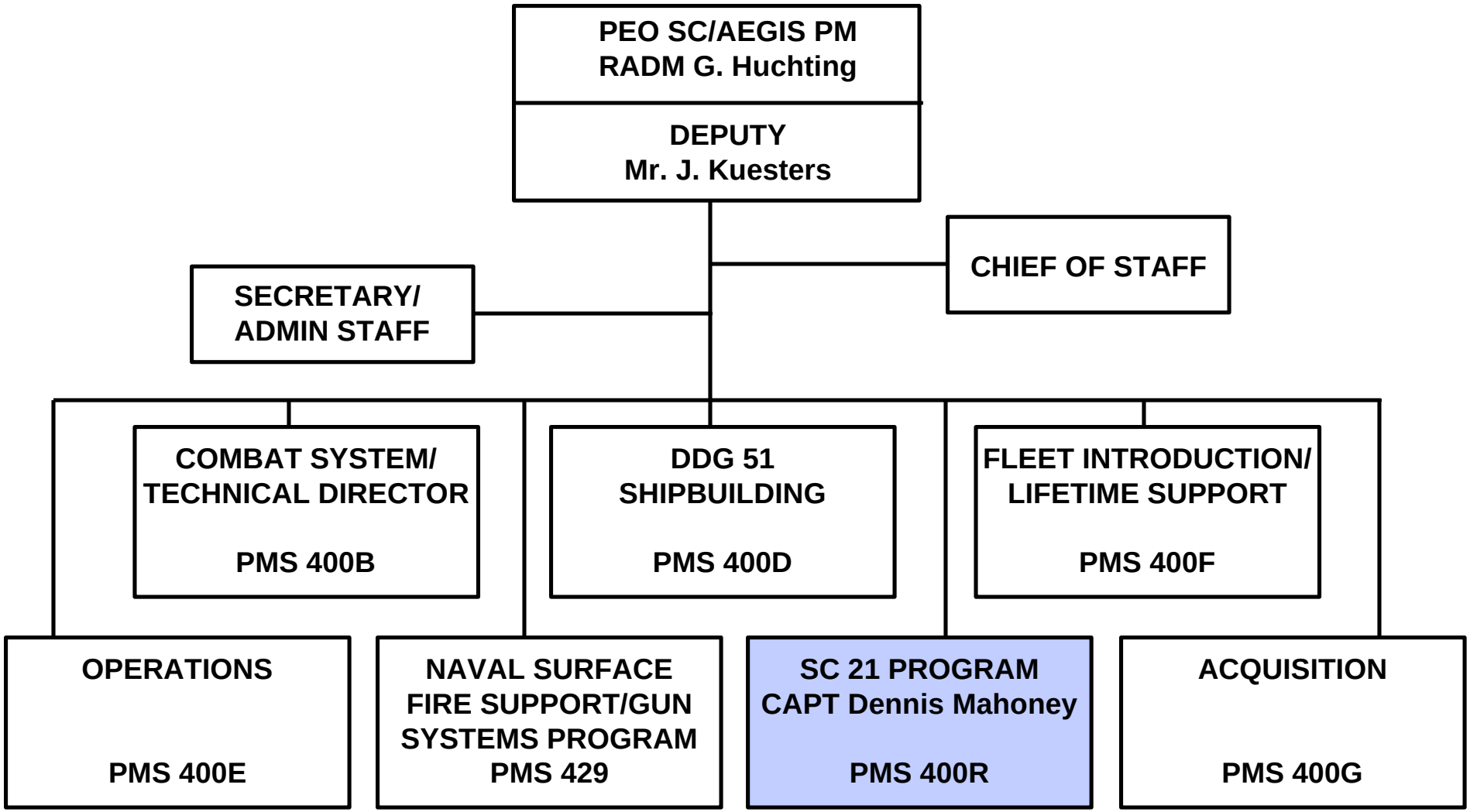
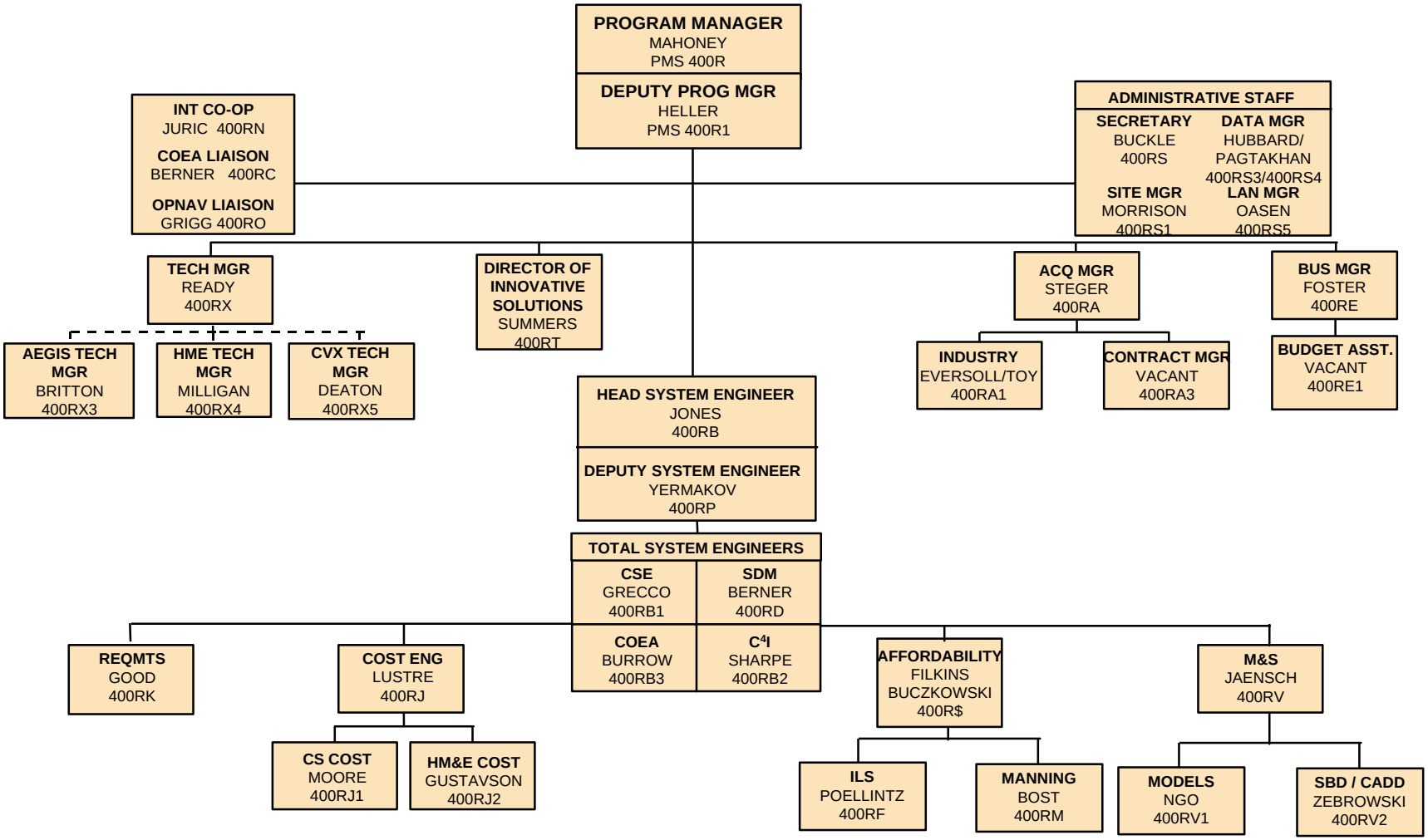
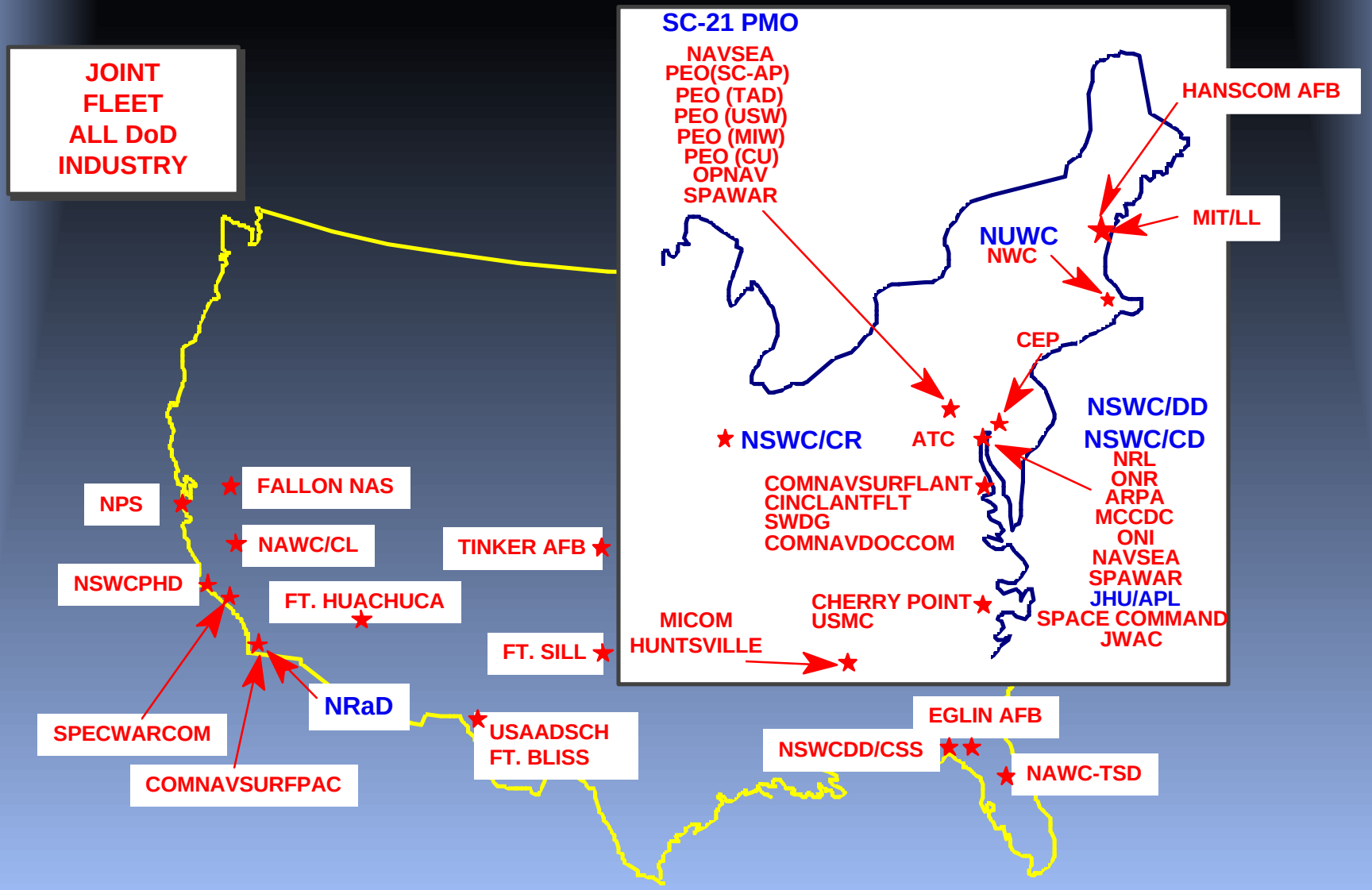
PEO SC/AEGIS PM ORGANIZATION



SC 21 ORGANIZATION CHART (PHASE 0)



SC21 TEAM


JOINT
FLEET
ALL DoD
INDUSTRY
SC-21 PMO
NAVSEA
PEO(SC-AP)
PEO (TAD)
PEO (USW)
PEO (MIW)
PEO (CU)
OPNAV
SPAWAR
HANSCOM AFB
MIT/LL
NUWC
NWC
CEP
NSWC/DD
NSWC/CD
NRL
ONR
ARPA
MCCDC
ONI
NAVSEA
SPAWAR
JHU/APL
SPACE COMMAND
JWAC
NSWC/CR
ATC
COMNAVSURFLANT
CINCLANTFLT
SWDG
COMNAVDOCCOM
CHERRY POINT
USMC
MICOM
HUNTSVILLE
NPS
FALLON NAS
NAWC/CL
TINKER AFB
NSWCPHD
FT. HUACHUCA
FT. SILL
NRaD
SPECWARCOM
COMNAVSURFPAC
USAADSCH
FT. BLISS
EGLIN AFB
NSWCDD/CSS
NAWC-TSD

Why SC 21?

- **Navy's Future ⇒ Nation's Defense**
- **Satisfy 21st Century *Joint* Warfighting Requirements**
  - SC 21 Mission Need Statement (JROC)
  - U.S. Navy-Marine Corps *Forward...From the Sea* Strategy
  - *Joint Vision 2010*
- **Maintain Required Surface Combatant Force Levels**
- **Produce *Affordable* Ships**
- **Fight and Win!**

SC 21 Mission Need Statement

- Power Projection
- Battlespace Dominance
- Command, Control, and Surveillance
- Survivability
- Mobility
- Fleet Support Operations
- Non-Combat Operations

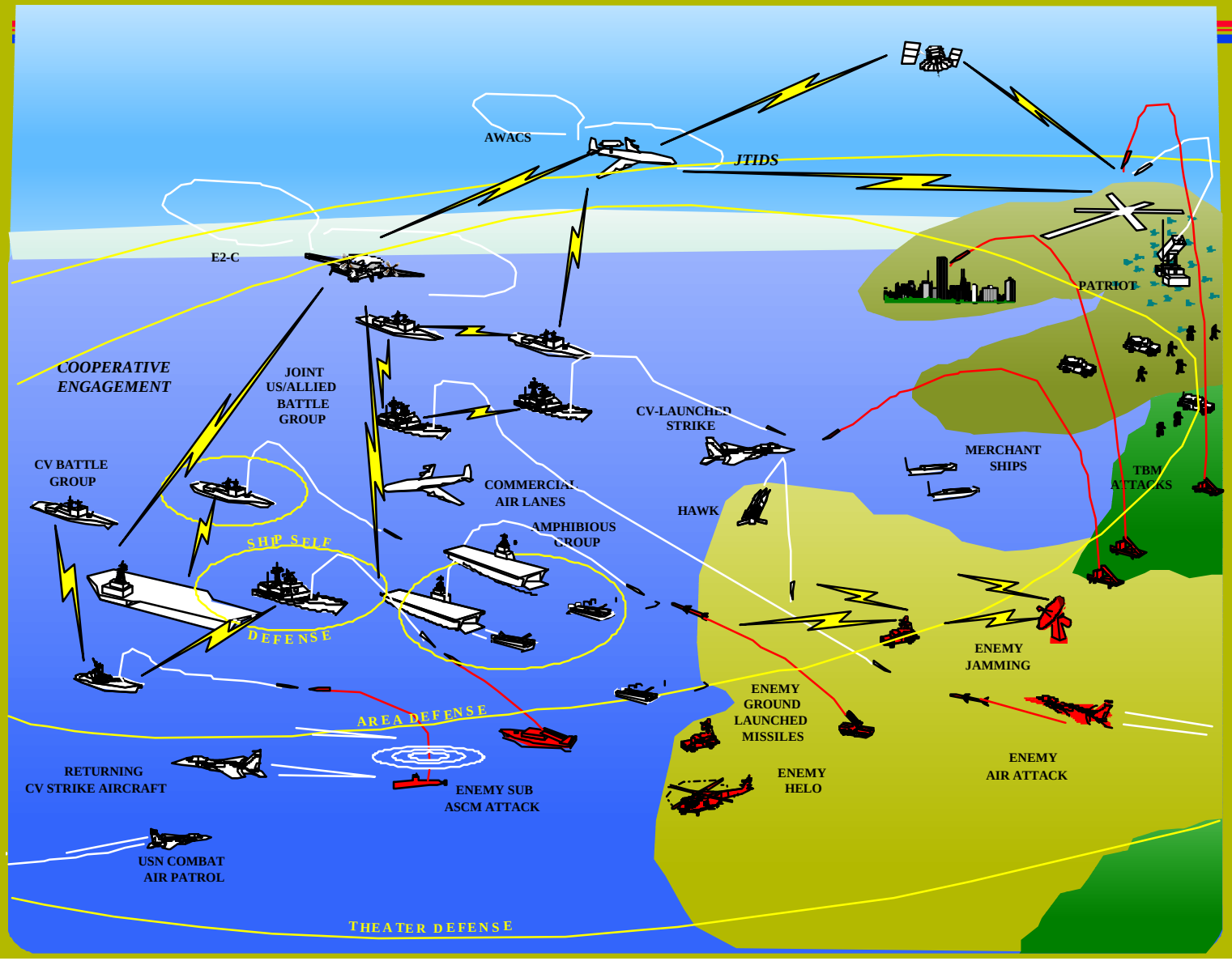
COMPREHENSIVE JOINT REQUIREMENTS

NAVSEA
PEO(SCIAP)
NSWC

Revolutionary Leap in Technology and Warfighting

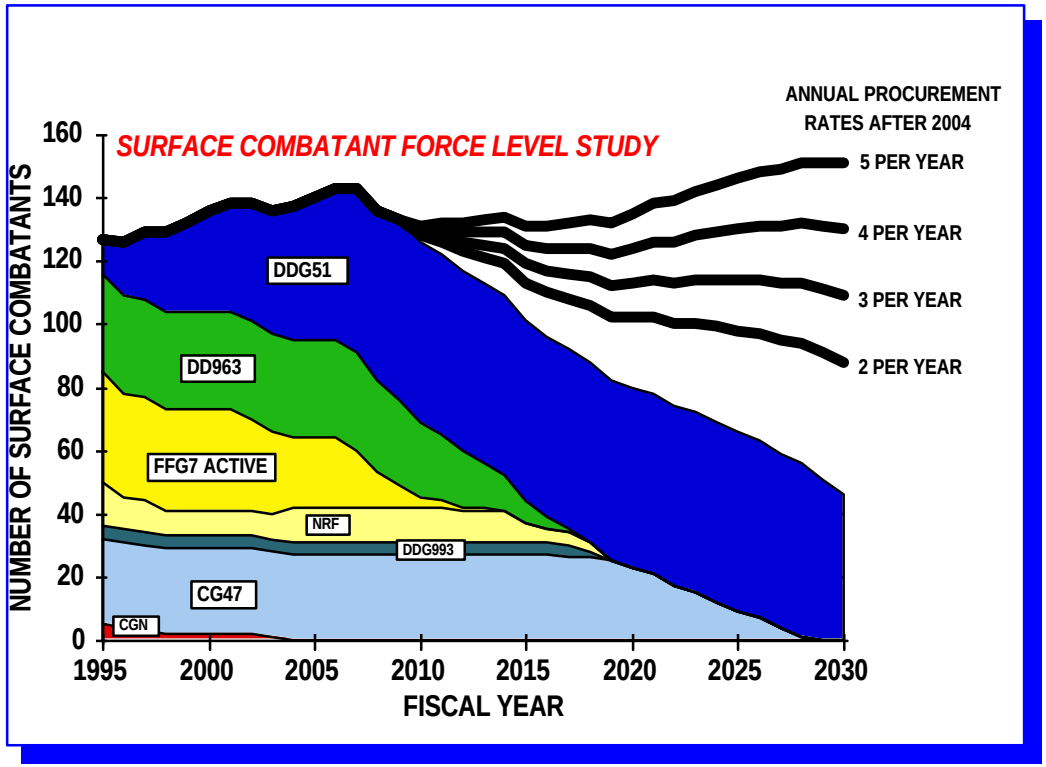
SC 21

LITTORAL ENVIRONMENT



SURFACE COMBATANT FORCE STRUCTURE

INVENTORY



REQUIREMENTS

- SCFLS : 135-165 FOR 2 MRC SCENARIO
  - INCREASED DEMAND FOR DIRECT SURFACE COMBATANT CONTRIBUTION TO GROUND CAMPAIGN
  - EMPHASIS ON MULTI-MISSION CAPABILITY
- FORCE ARCHITECTURE ASSESSMENT: 157
- N3/5 PRESENCE STUDY: 120-135
- BOTTOM UP REVIEW: 110-116
- CURRENT OPS: AVG 121
- TODAY'S INVENTORY: 115
  (PLUS 10 NRF FFG'S)

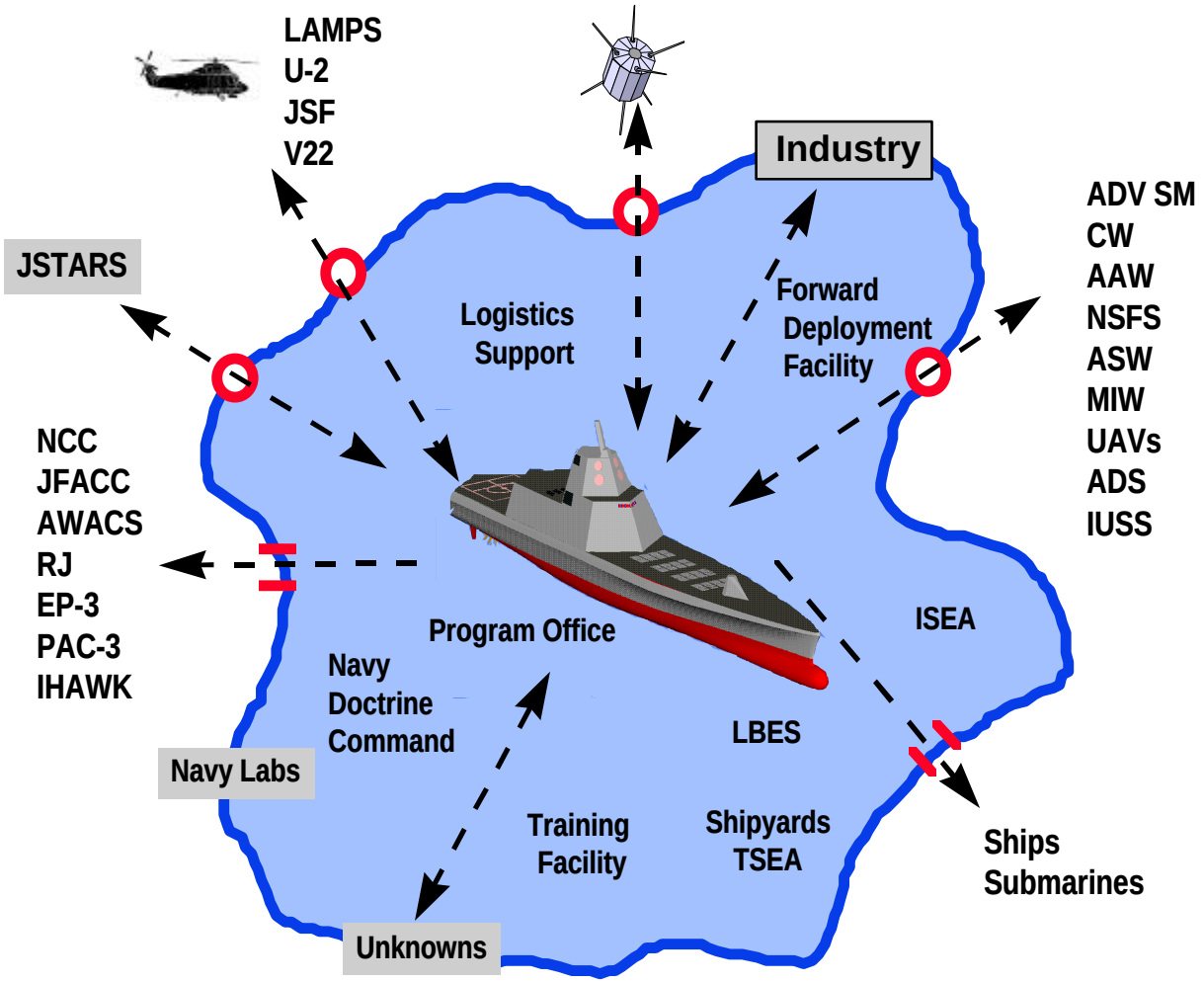
SC 21 Program Status

- **Milestone 0** -- Defense Acquisition Board (Jan '95)
- **Phase 0 Focus**
  - Cost and Operational Effectiveness Analysis (Part 2)
  - Prep for Milestone I >> July 1997
  - Total ship concept development
  - Technology maturation / assessment / transition
  - Acquisition planning / strategy
  - Financial planning
- **SC 21 Homepage**
  - **http://SC21.crane.navy.mil**
  - Provides updated information on the SC 21 program, including official reports, industry announcements, journal articles, briefing papers, etc.

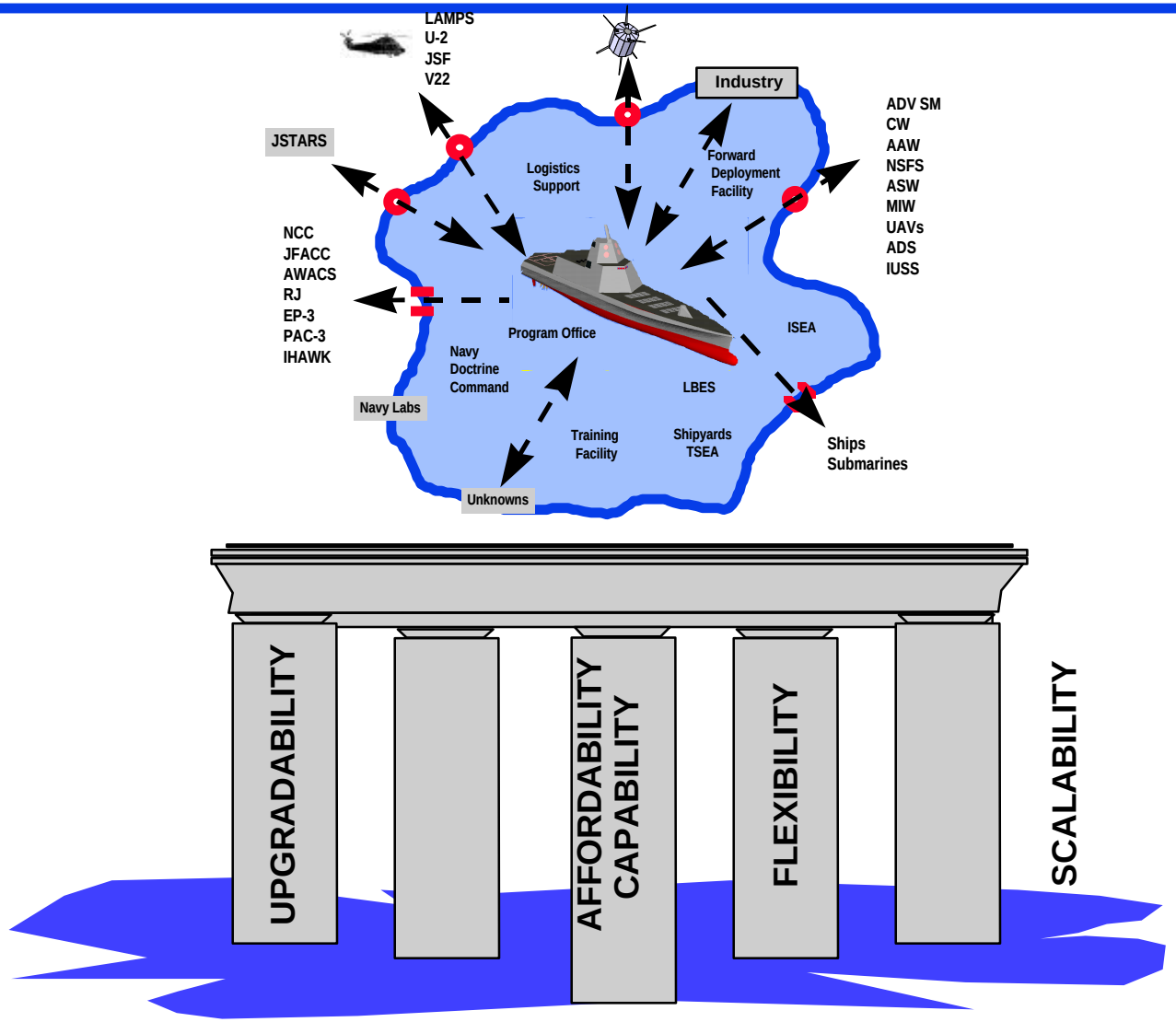
SC 21 Challenges / Opportunities

- **Understanding Requirements**
  - Capability / Affordability Tradeoff
- **Total System Engineering**
  - Technology Transition / Risk Reduction
  - Modeling and Simulation
- **Acquisition Reform**
  - *Early* Industry Involvement and Innovation
- **Resources**
  - Domestic and *International R*esources

The SC 21 "System"



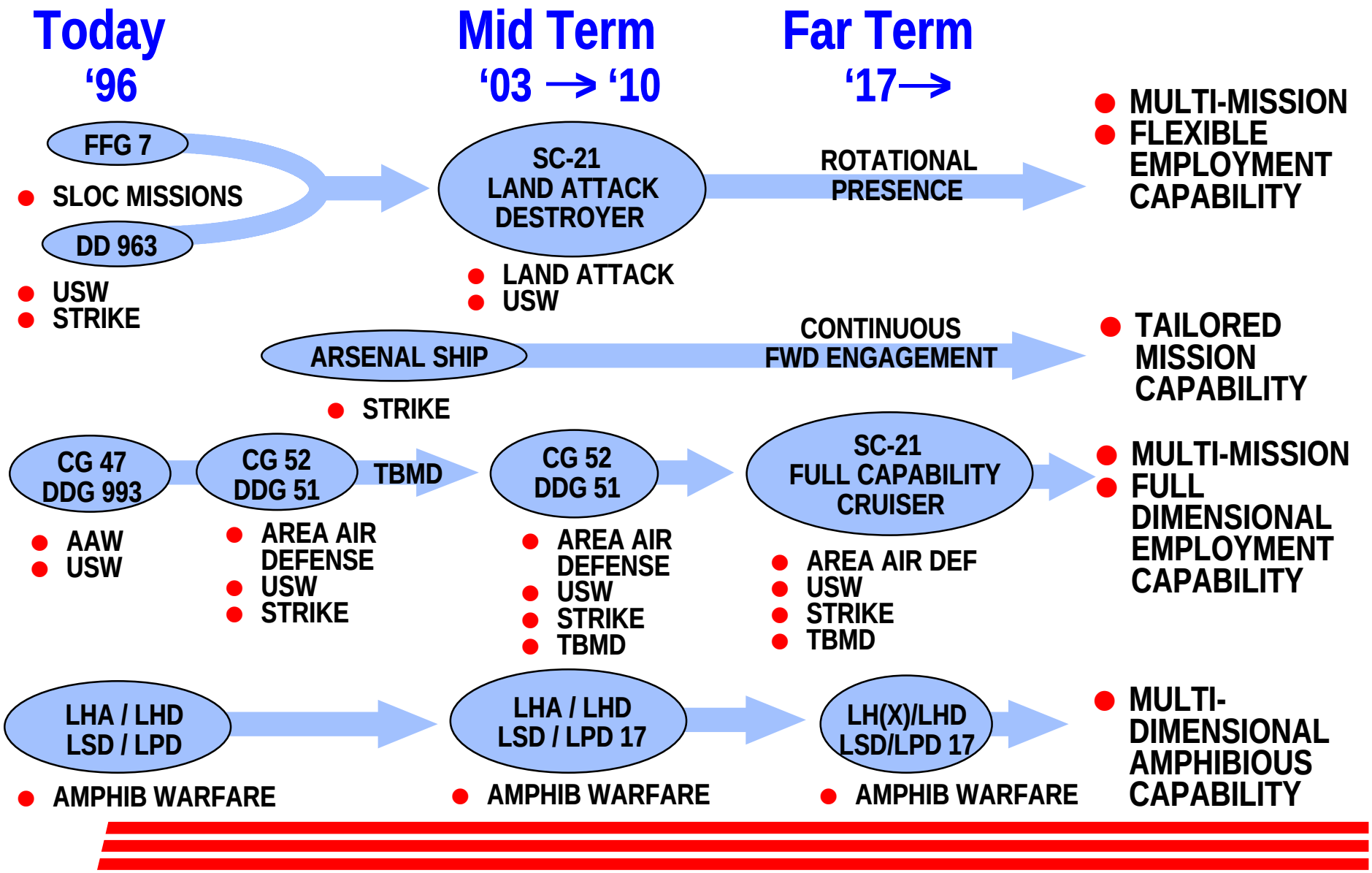
SC 21 Program Objectives (Pillars)



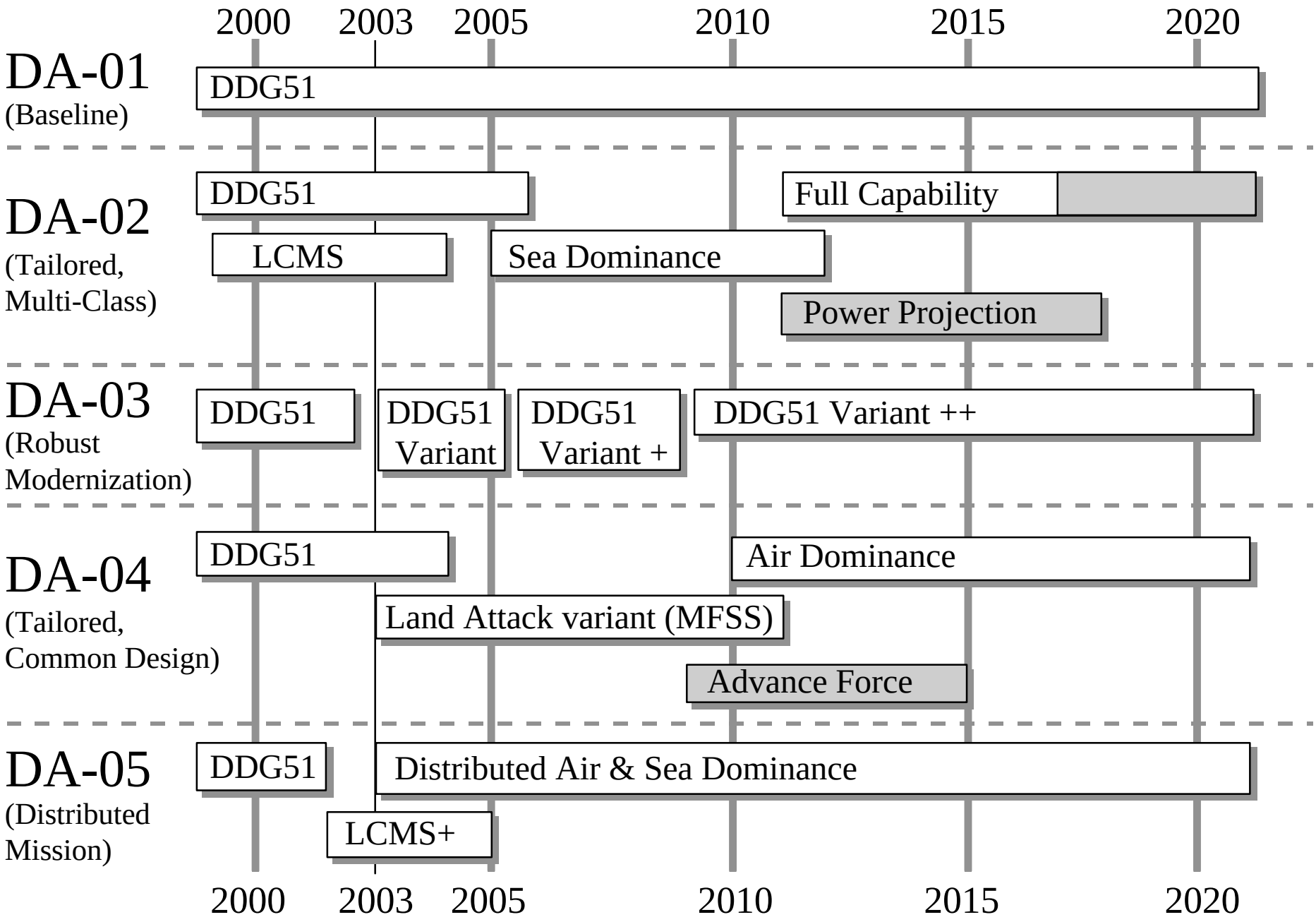
N86 Direction

- **Signature reduction goals**
  - Radar cross section (RCS)
  - Infrared (IR)
  - Acoustic
  - Magnetic
- **Reduced manning goals**
  - “Maximum crew size of 95, including helicopter detachment”
  - 30% of DDG 51
  - Review NATO navies’ manning concepts
  - Conduct HARDMAN analysis
  - PEO SC/AP lead
- **Life-cycle cost reduction goals**
  - Approximately 30% of DDG 51
  - Essential to supporting required force levels

SC 21 Family of Ships Evolutionary Concept



SC 21 COEA Decision Alternatives



SC 21 Concept of Operations

- Now Focused on **Joint Land Attack** and **Maritime Dominance** missions
  - Naval Surface Fire Support
  - Strike Warfare
  - Surface Warfare
  - Undersea Warfare (Submarine and Mine Warfare)
- **Carry War to the Enemy Offensively**
  - Close Fire Support to 100 nm
  - Battlefield Interdiction to 250 nm
  - Supersonic Precision Strike to 1,000 nm
- **Three Operational Situations**
  - Independent, Near-Land Operations
  - Integrated Battle Force
  - Amphibious Ready Group (Naval Expeditionary Task Force)
- **Deployment Cycle**

Land Attack variant
NOTIONAL COMBAT SYSTEMS CHARACTERISTICS (U)

Air Dominance

- Volume Search Radar
- X-Band Multifunction Radar and Illuminator
- Evolved Sea Sparrow Missile (ESSM) P^3I
- Advanced Decoys
- Advanced Integrated Electronic Warfare System (AIEWS) Increment 1
- Mk XII IFF Upgrade
- Cooperative Engagement Capability (CEC)
- Advanced Warfare Control System

Power Projection

- Advanced Tomahawk Weapon Control System
- 2 x Mk 45 5”/62 Gun with ERGM*
- Armed Helicopters (SH-60R, Marine/Army Attack Helicopters)
- Special Operations Support
- UAV Launch/Control
- Mk 41 VLS - Fire Support Missile, ESSM Tomahawk Block III, IV, IVD/TSTAR
- Army Field Artillery Tactical Data System
- V-22 Landing Capable

* Upgradable to Vertical Gun (VGAS)

Sea Dominance

- Reduced Impact AN/SQS-53C Hull Sonar
- High Frequency Bow Sonar
- Lightweight Broadband Variable Depth Sonar (LBVDS)
- Multi-Function Towed Array (MFTA)
- ASW Torpedoes (Lightweight Hybrid Torpedo)
- Vertical Launched ASROC
- SSTD System (with Anti-Torpedo Torpedo)
- Thermal Imaging Sensor System (TISS)
- 2 x LAMPS Mk III SH-60R Helicopters
- Remote Minehunting System (RMS)
- Airborne Laser Mine Detection System (ALMDS)
- Mine Acoustic Countermeasures (MACM)
- Advanced Degaussing
- Mk 38 25mm Guns (CIGS)

Command & Control

- LINKS 11, 16, 22
- JMCIS/GCCS
- UHF/EHF/SHF SATCOM
- BGPHES
- JMCOMS
- GBS
- TDDS
- CHBDL

Full Capability Combatant
NOTIONAL COMBAT SYSTEMS CHARACTERISTICS (U)

Air Dominance

* Solid State Volume Multi-Function Radar (MFR)
* Solid State X-Band Horizon MFR/Illuminator
* Advanced Integrated Electronic Warfare System (AIEWS) Increment II
* Advanced Decoys
* MK 41 VLS (128 nominally):
  - ESSM P3I
  - SM-2 Block IVA
  - Theater Ballistic Missile Defense Missile
* Cooperative Engagement Capability (CEC)
* Identification System
* Advanced Control System (ADCON-21)

Command & Control

* Joint Maritime Command Information System (JMCIS)
* Global Command and Control System (GCCS)
* Joint Tactical Information Distribution System/ Link 16
* NATO Improved Link-11/Link-22
* SHF/UHF/EHF SATCOM
* Joint Maritime Communication System
* Global Broadcast Service
* Common High Bandwidth Data Link (CHBDL)/ Battle Group Passive Horizon Extension System
* Ship's Signal Exploitation Equipment
* Multi-Function, Multi-Beam Broadband Antenna
* Thermal Imaging Sensor System (TISS)
* Cryptologic Support System (CSS)
* Tactical Data Distribution System (TDDS)
* MMBA/MFAA

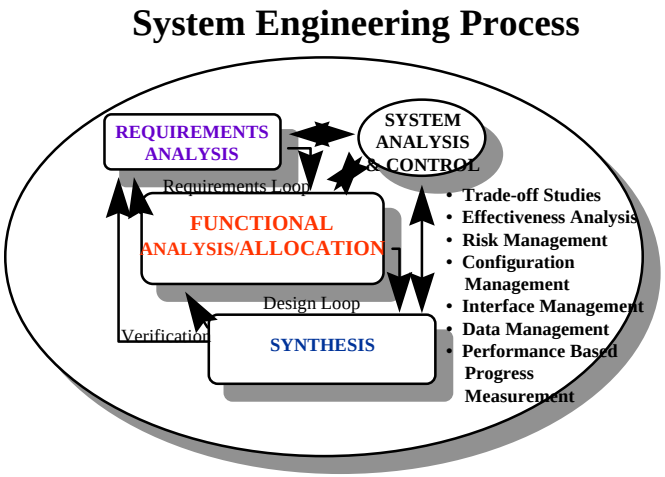
UnderSea Dominance

* AN/SQQ-89 Variant
* Light Weight Broadband Variable Depth Sonar (LBVDS)
* Broadband Hull Sonar
* High Frequency Bow Sonar (integrated into bow dome)
* LAMPS MK III - SH-60R (Level 1, Class 1)
* Airborne Laser Mine Detection System (ALMDS)
* Mine Acoustic Countermeasures (MACM)
* MK 41 VLS - Vertical Launched ASROC
* ASW Torpedoes (Lightweight Hybrid Torpedo/MK-50)
* Surface Ship Periscope Detection
* Mine Warfare Remote Minehunting System (RMS)
* Surface Ship Torpedo Defense System/Anti-Torp. Torpedoes
* Advanced Degaussing

Land Attack/Surface Dominance

* Advanced Tactical Weapon Control System (ATWCS)
* MK 41 VLS
  - Tomahawk BLK III/IV
  - Tomahawk with Sensor Fused Weapons or Brilliant Anti-Tank (BAT) Munitions
  - Fast Response Missile
* Vertical Gun and Advanced Munitions
* Armed Helicopter (SH-60R, Marine/Army Attack Helicopters)
* Special Operations Forces Accommodation
* UAV Launch/Mission Planning and Control Station (MPCS)
* Close-In Guns System (CIGS)

QFD Flowdown



Strategy

Missions

CONOPS

MOE/
MOP

Tasks

Top Level
P-Spec

Functions

Tier 0 → A Spec
Tier 1 B Spec
Tier 2 C Spec
Tier 3 D Spec

ORD

Attributes

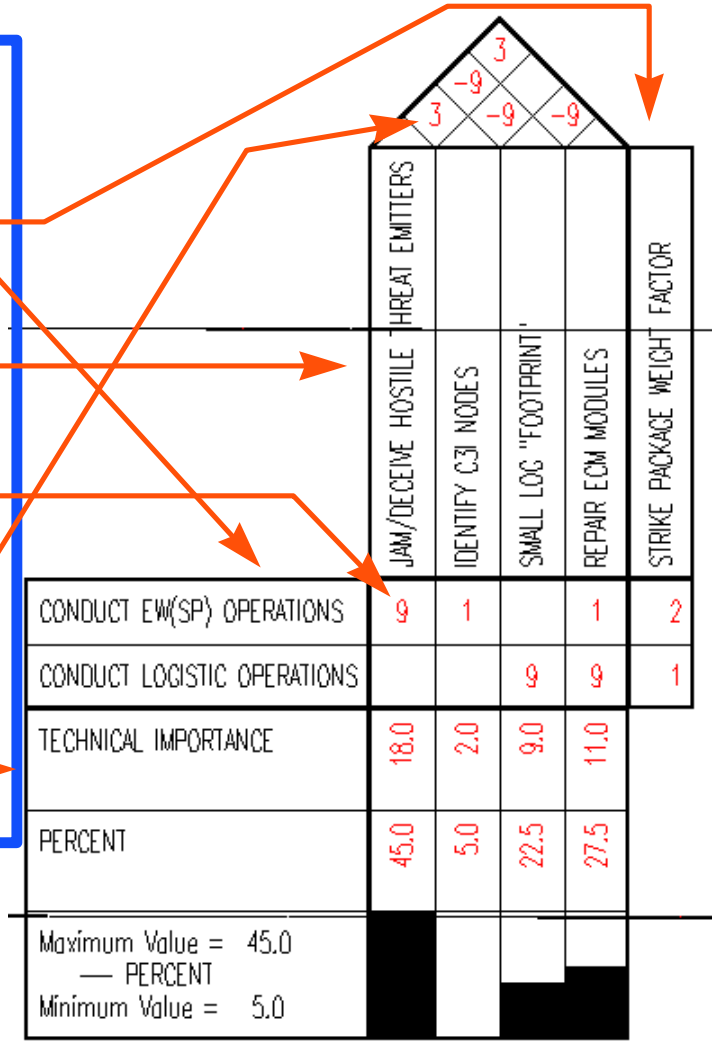
System Candidates

Technology

Tech. Dev.
Architecture
Doctrine

Quality Function Deployment: "HOUSE OF QUALITY"

- ***IDENTIFY*** THE "WHATs"
- ***PRIORITIZE*** "WHATs"
- ***IDENTIFY*** "HOWs"
- ***RELATE*** "HOWs" TO "WHATs"
- ***CORRELATE*** "HOWs"
- ***EVALUATE*** "HOWs"

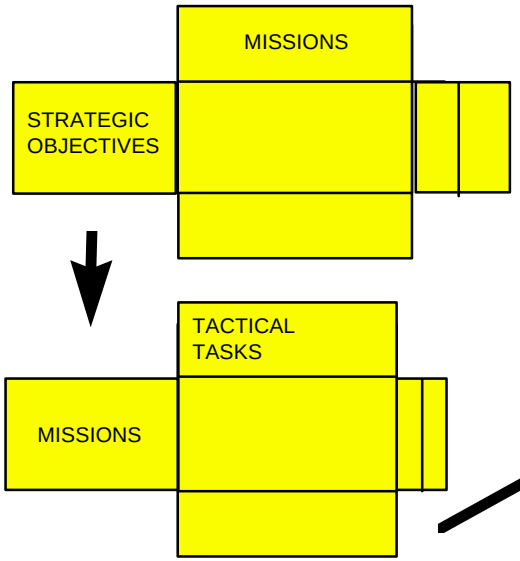


SC 21 QFD Flowdown

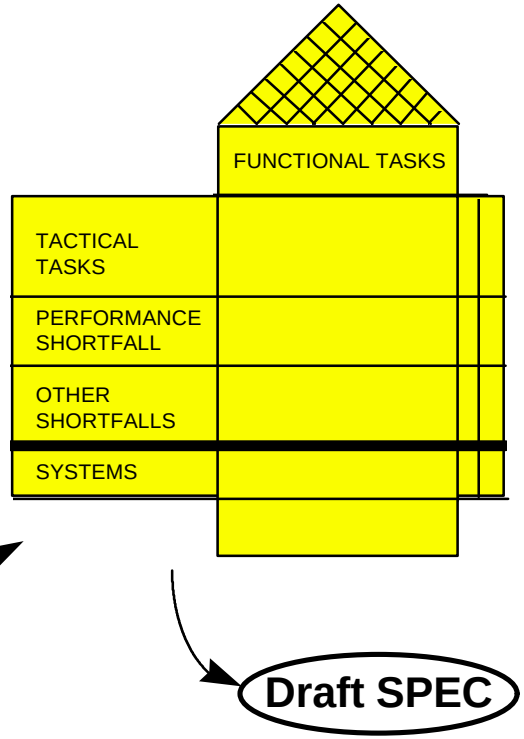
ConOps

- Baseline
- Peacetime
- IBG/Crisis Response/ Military Preparedness
- Wartime

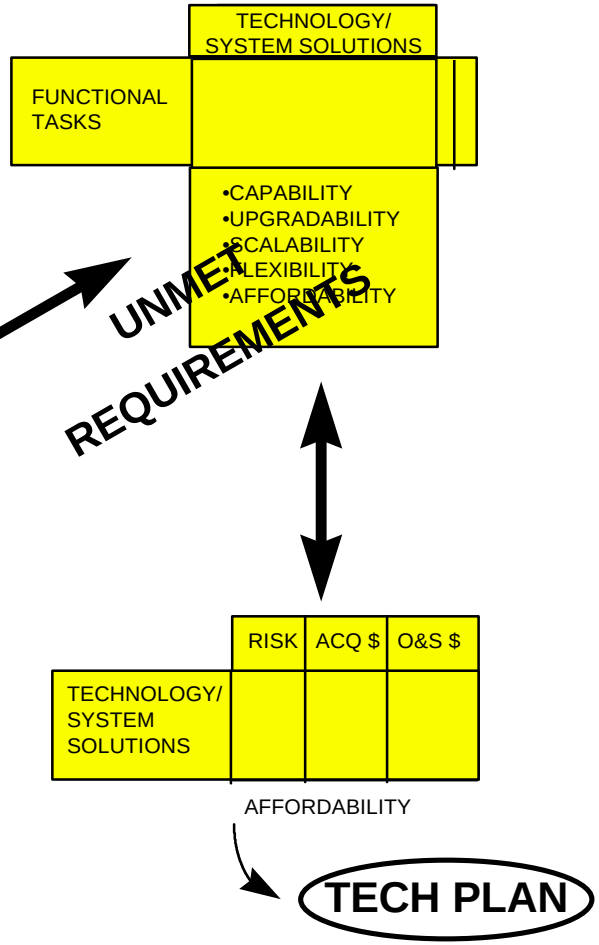
Needs
(FLEET/OPNAV INPUT)



Characteristics
(SC 21 IPT/SEFT INPUT)



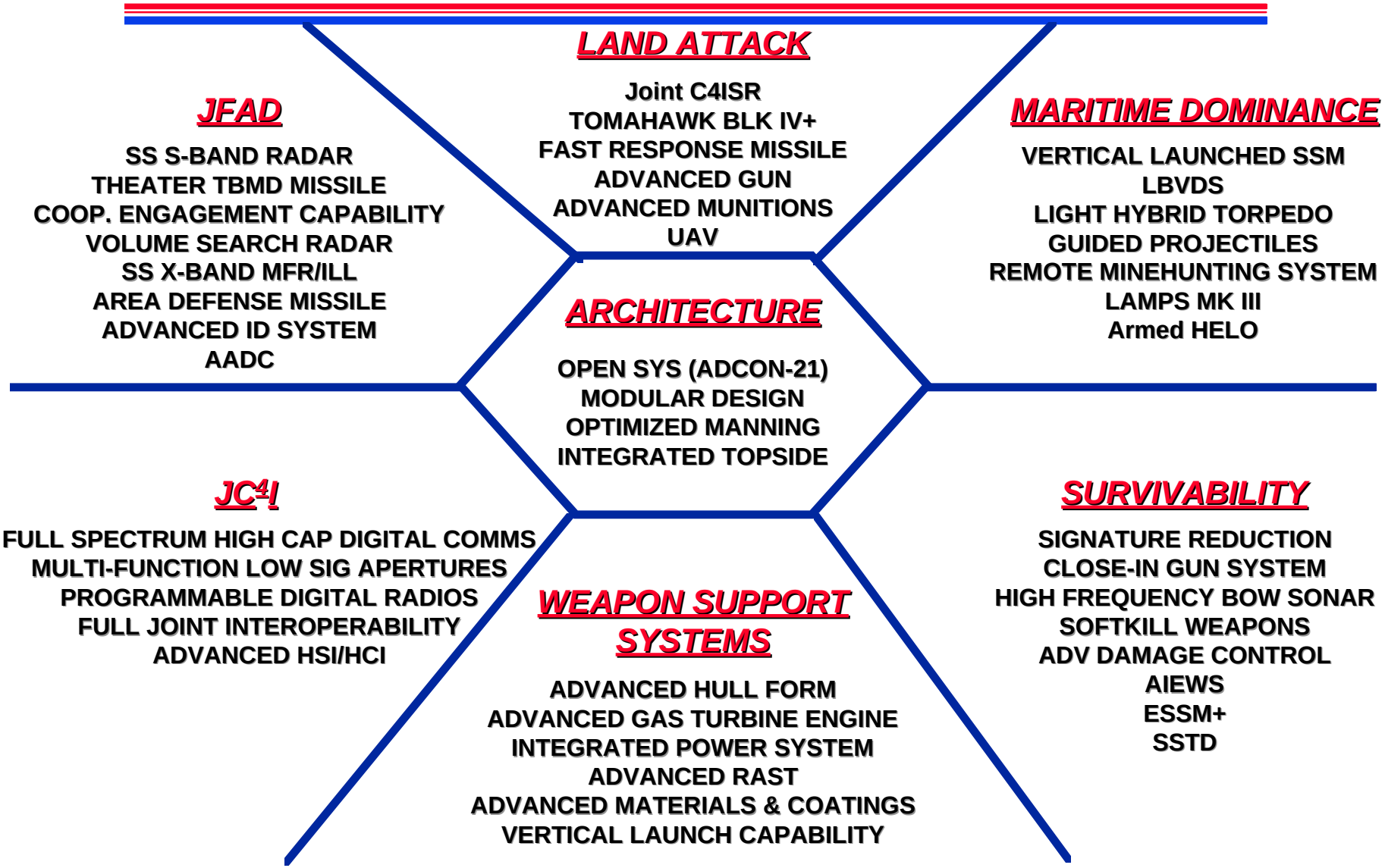
Solutions
(SYSCOM/ONR/DARPA/ INDUSTRY INPUT)



Key Benefits of QFD

- **Quality**
  - Organizes and Levels Requirements
  - Helps Optimize Product and Process Design
- **Cost**
  - Streamlines Requirements Iteration Process
  - Shortens Product Development Cycle
  - Reduces Number of Engineering Changes
- **Communications**
  - Emphasizes the Voice of the Customer
  - Improves Understanding of Other Discipline's Requirements
  - Provides Common Language and Data Base
- **Documentation**
  - Produces a Detailed, Working Documentation Trail
  - Provides Continuous Comprehensive Evaluations

SC 21 System Needs

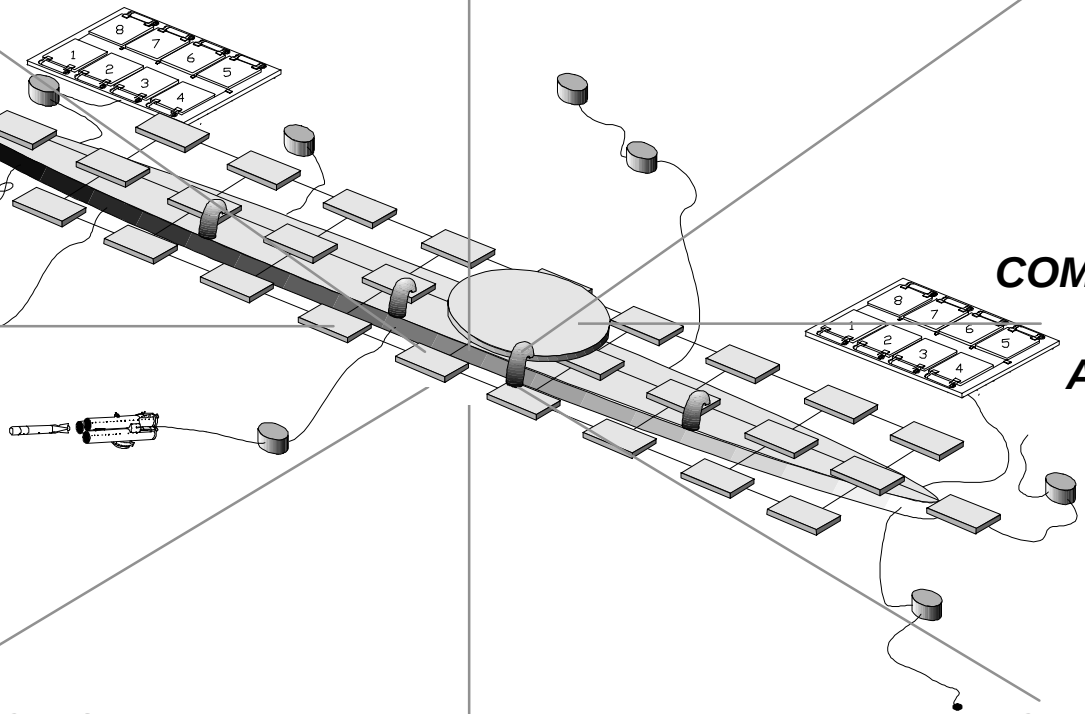


Total Ship Enablers

SHIPWIDE COMPUTER/ DISPLAY ARCHITECTURE

INTEGRATED TOPSIDE DESIGN

MULTI-FUNCTION WEAPONS LAUNCHER



INTEGRATED JOINT COMMUNICATIONS

COMMAND SPACES DESIGNED AS UTILITIES

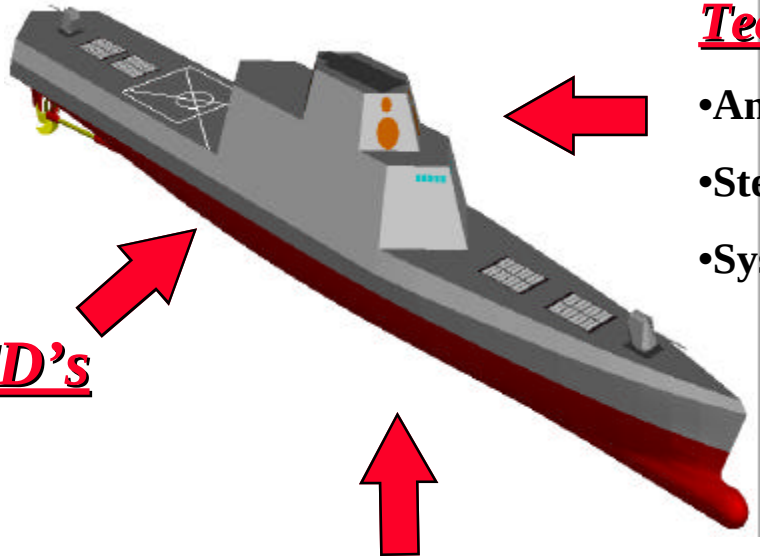
INTEGRATED SENSOR SUITE

STEALTH

AUTONOMICS AND EMBEDDED TRAINING

A WARSHIP IS A WEAPON SYSTEM

Integrated Topside

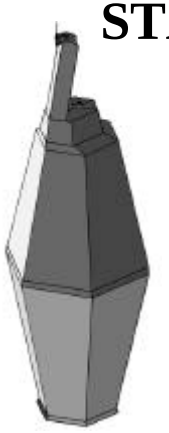


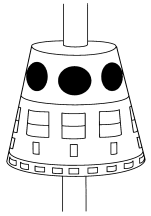
Technology Base

- Antennas (aircraft)
- Stealth Integration
- Systems Engineering Tools
  - Modeling & Simulation

ATD's

STACK-98?





MERS-97

AEM/S-95

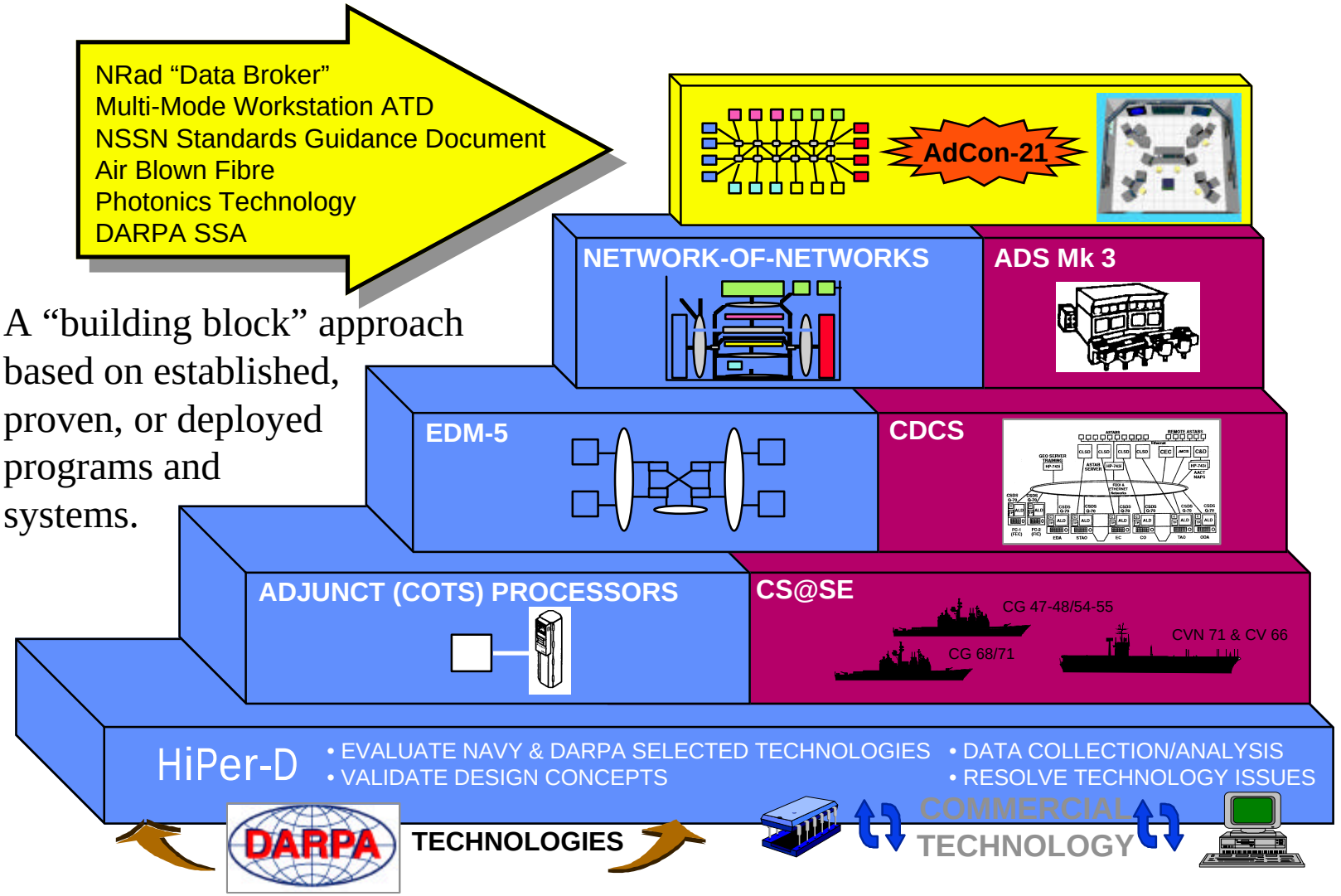
Program Activities

- Integrated Surface Ship Topside Design - N86
- Ship Concept Advanced Design - N86
- Integrated Ship Signature Study (IS3) CNO Sponsored
- Shipboard Multi-function Apertures ONR 31

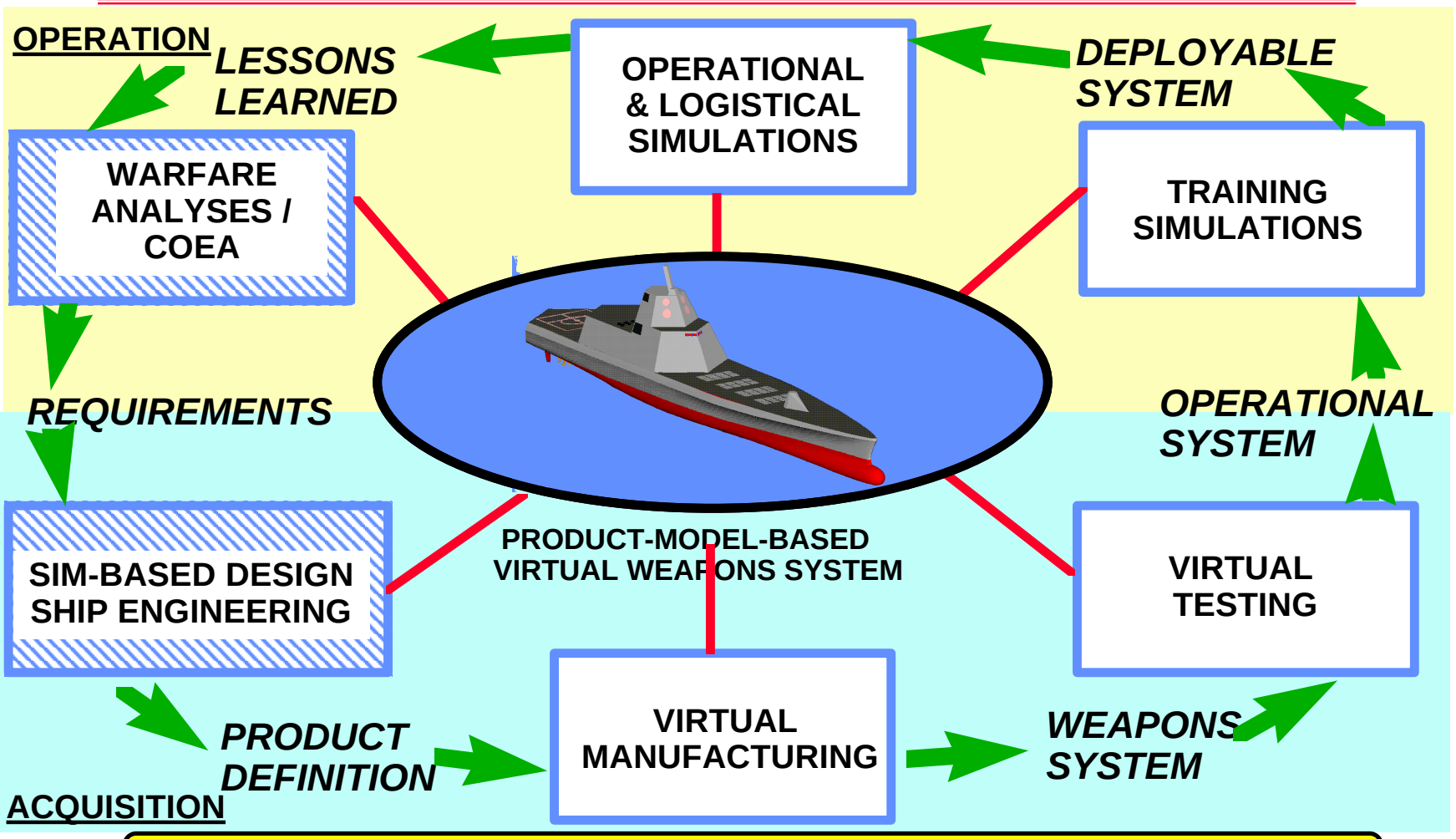
Advanced Control - 21st Century

NRad "Data Broker"
Multi-Mode Workstation ATD
NSSN Standards Guidance Document
Air Blown Fibre
Photonics Technology
DARPA SSA

A "building block" approach based on established, proven, or deployed programs and systems.

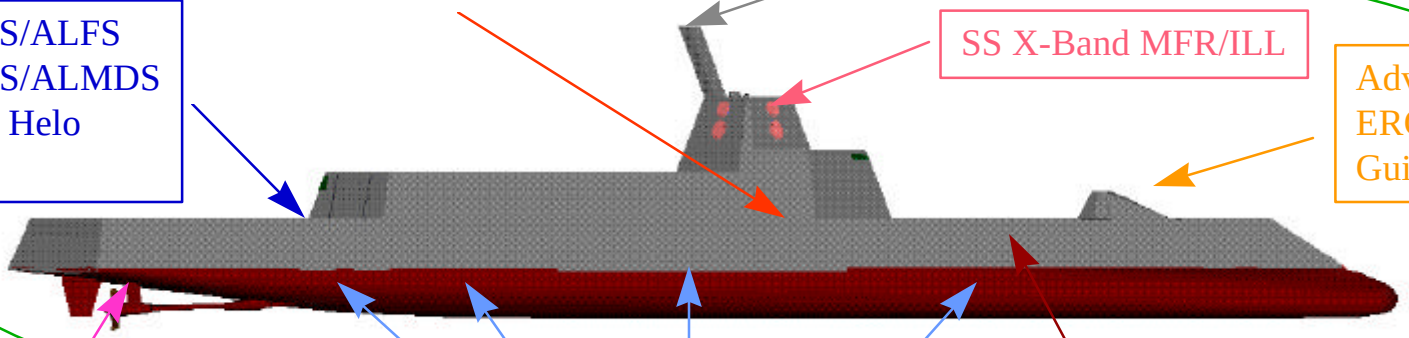


Modeling and Simulation in the Ship's Life Cycle



VISION: CONCEIVE, DESIGN, BUILD, TEST, TRAIN, AND OPERATE A WEAPONS SYSTEM IN A COMPUTER

Common Features
for
Technical Feasibility Model



Computational Plant
Advanced Displays
Manning
Autonomics
Embedded Training

MFAA/ACES
RT Freq Mgt Sys
High Data Rate Comm
Multi-Sensor Integration
Advanced Tactical ID
AIEWS

Total Ship Signatures Management

LAMPS/ALFS
LAMPS/ALMDS
Armed Helo
UAV

SS X-Band MFR/ILL

Advanced Gun
ERGM
Guided Projectile

LBVDS
SSTD

Modular Design
STD Monitoring & Control System
Integrated Power System (IPS)
Advanced Fuel Efficient Gas Turbines

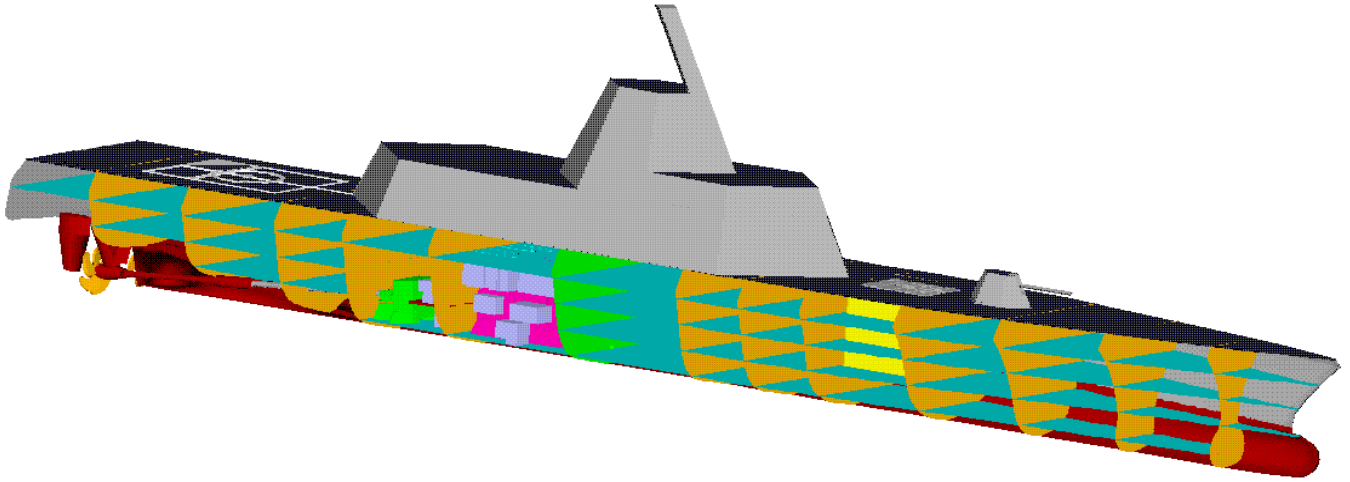
SM-2 BLK IVA
Theater TBMD Msl
High Kinematic Msl
Tomahawk BLK IV
TSTAR
ASUW Msl

Superset Concept

- Builds on COEA Ship Concept for Full Capability Combatant as "Superset" for requirements
  - Air Dominance Ship Concept adapted to reflect same ship concept to streamline analysis
- Incorporate both physical and functional modularity for *UPGRADABILITY* and *FLEXIBILITY*
- *SCALEABLE* Superset requirements support tailored-mission combatants as subsets
- Guide technology development in partnership with Industry team

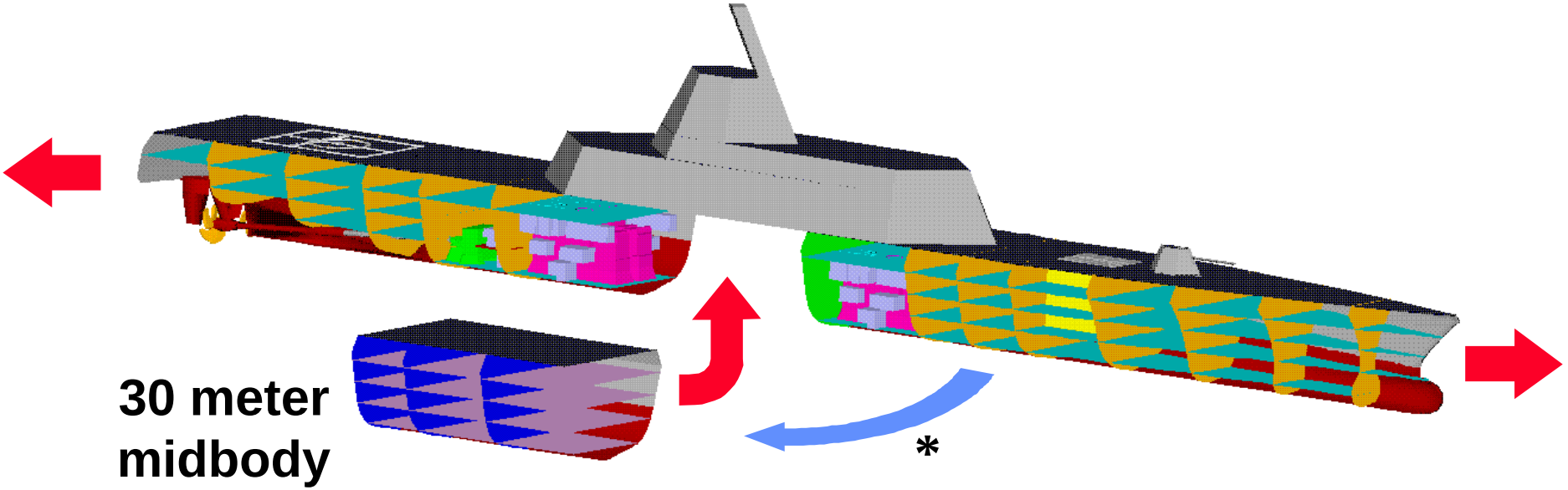
Superset Design Concept (1 of 3)

- Ship subdivision and outfitting optimized for future upgrade (e.g., Sea Dominance Ship to Full Capability Combatant)



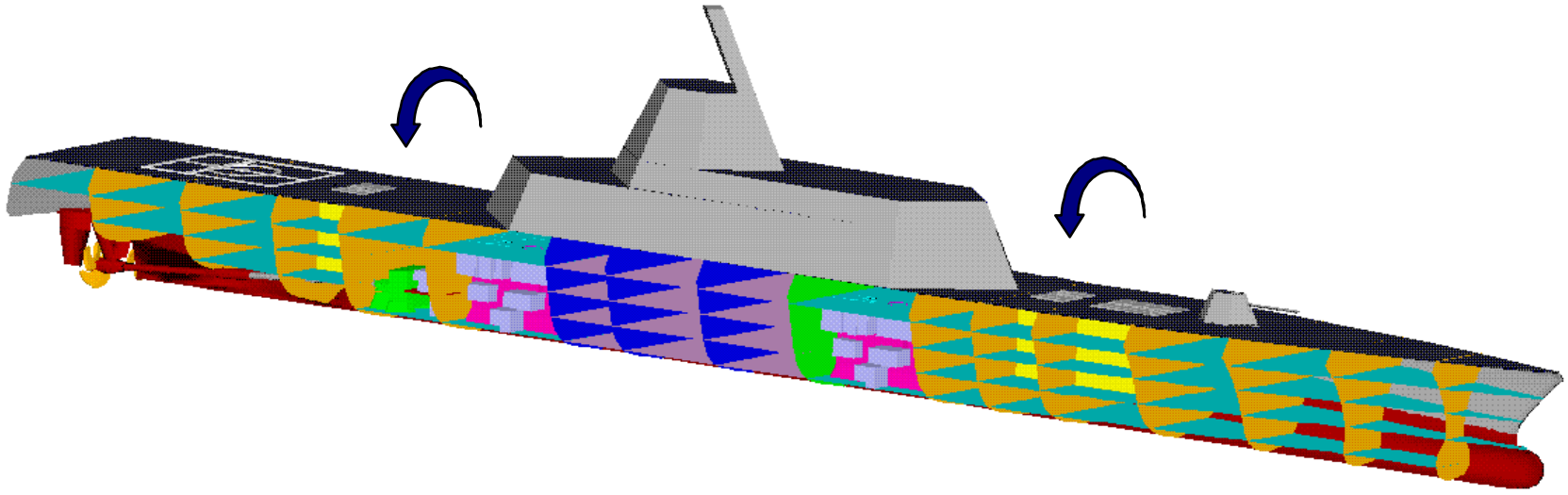
Superset Design Concept (2 of 3)

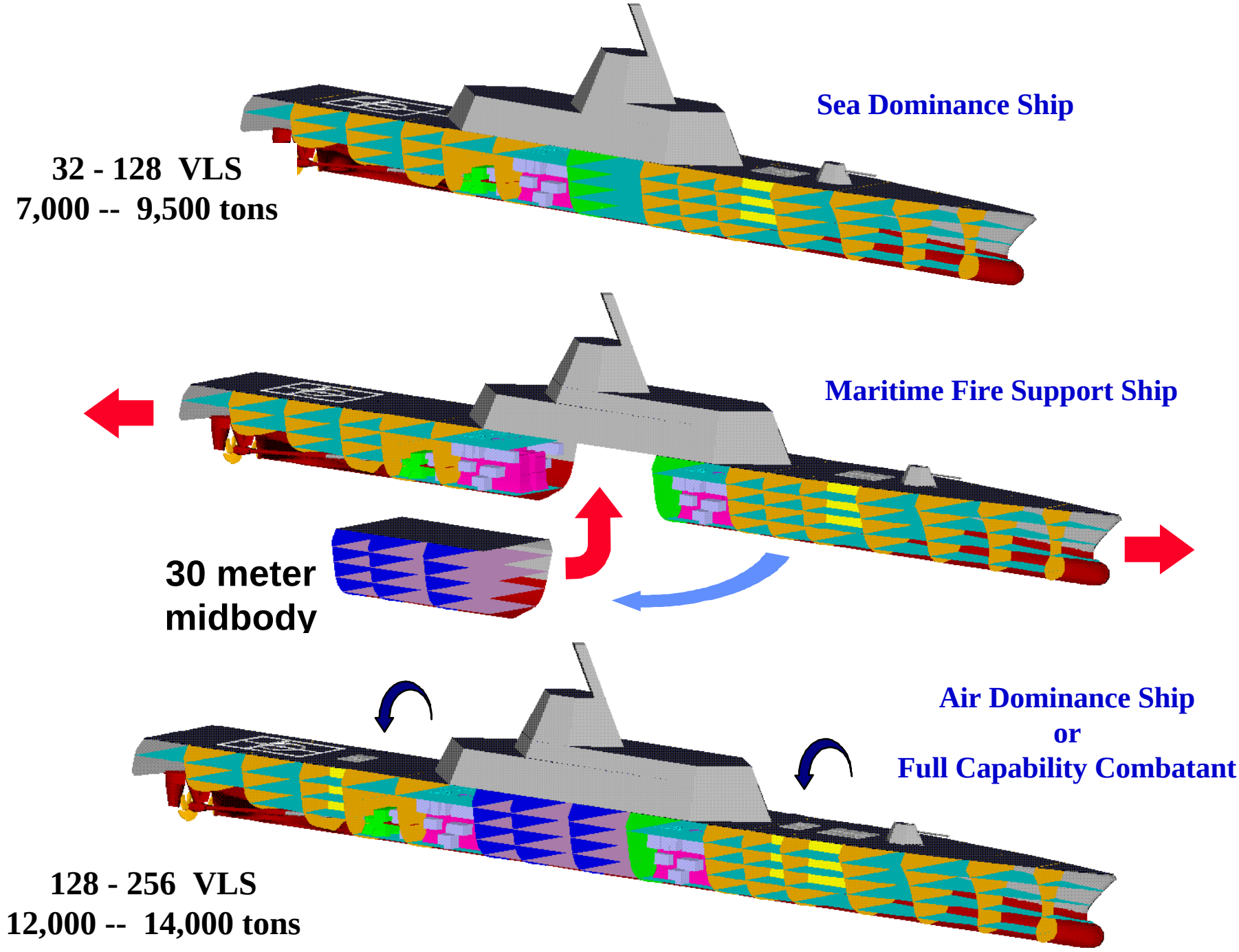
- Pre-determined ship functions transfer into new parallel midbody *



Superset Design Concept (3 of 3)

- Vacated subdivisions receive weapons modules or other upgrades

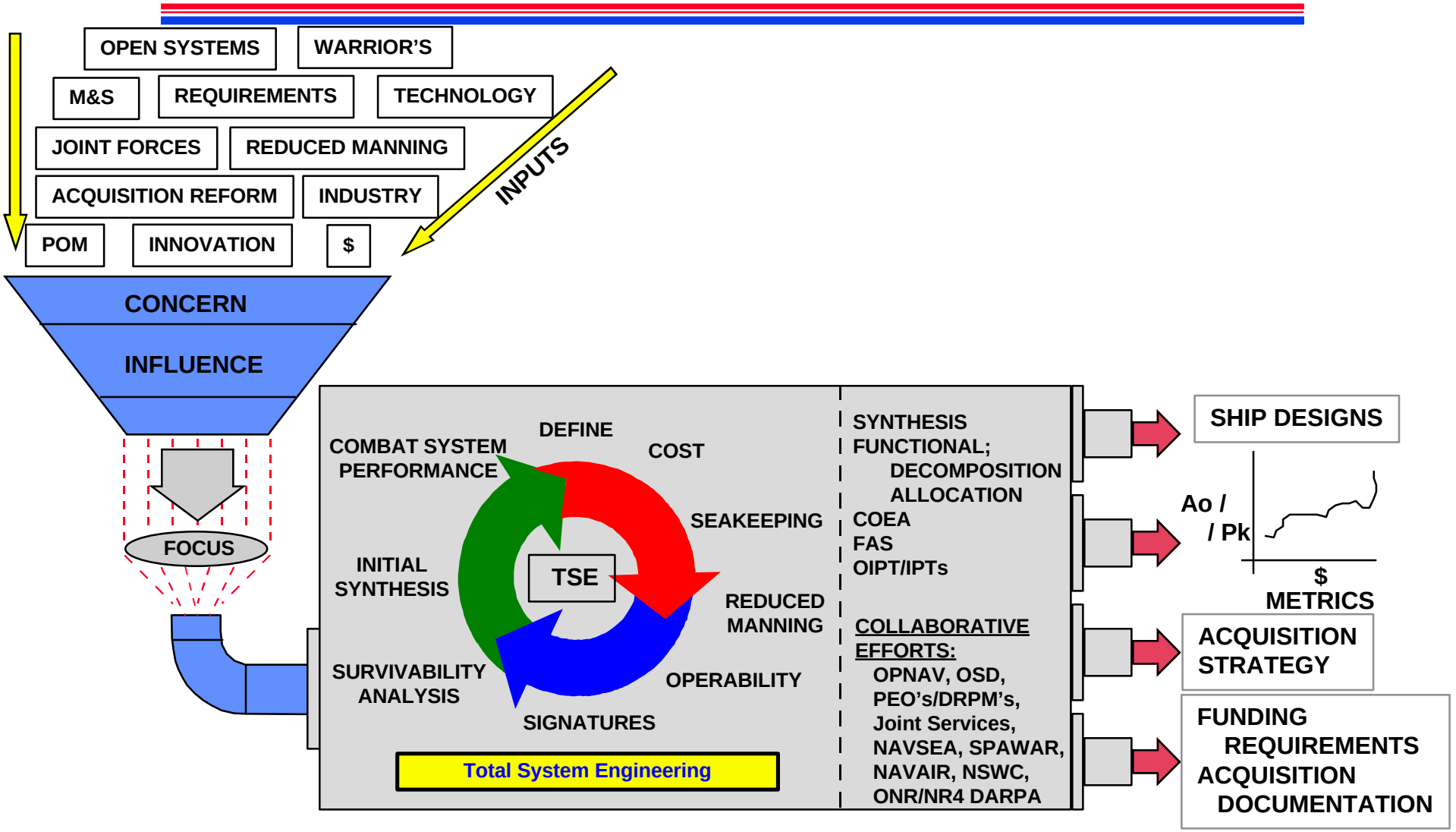



Sea Dominance Ship
32 - 128 VLS
7,000 -- 9,500 tons
Maritime Fire Support Ship
30 meter
midbody
Air Dominance Ship
or
Full Capability Combatant
128 - 256 VLS
12,000 -- 14,000 tons

Industry Issues

- **Performance Specification** ("What," not "How to")
- **Schedule between now and MS I**
  - **Technology Concept Studies (Advance Planning Cell)**
  - **Industry Feedback on Key Acquisition Documents**
    - » **Draft ORD/QFD/ConOps**
    - » **P-Spec.**
    - » **RFP**
- **Level of Gov't / Industry Interaction (Post MS I)**
- **Level of GFE/CFE Procurement**
- **Supportability**
  - Ramifications for transitioning certain elements of Government R&D / "Support" infrastructure to Industry

SC 21 Phase 0 Efforts

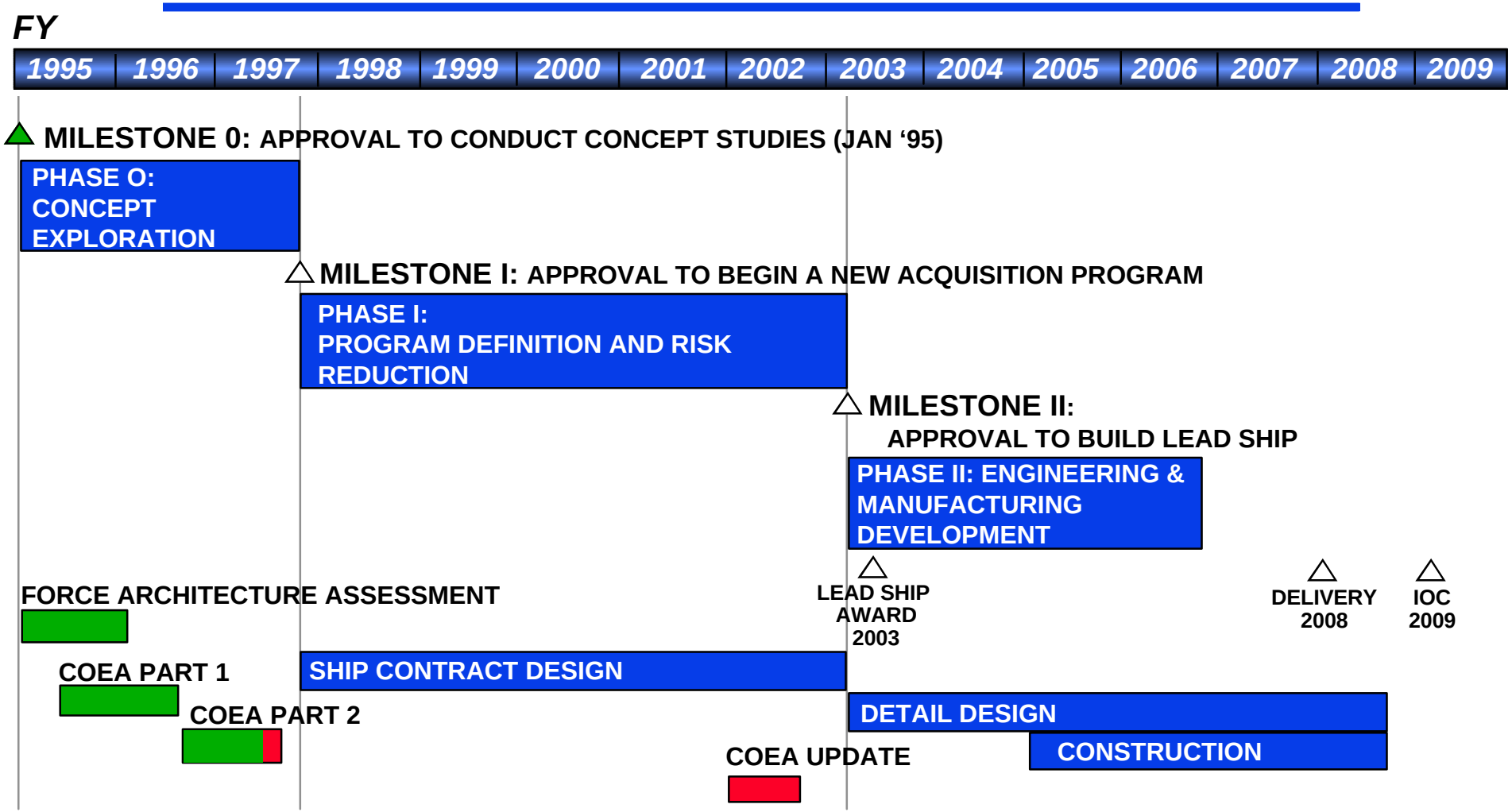


FILE: FUNNEL.PPT

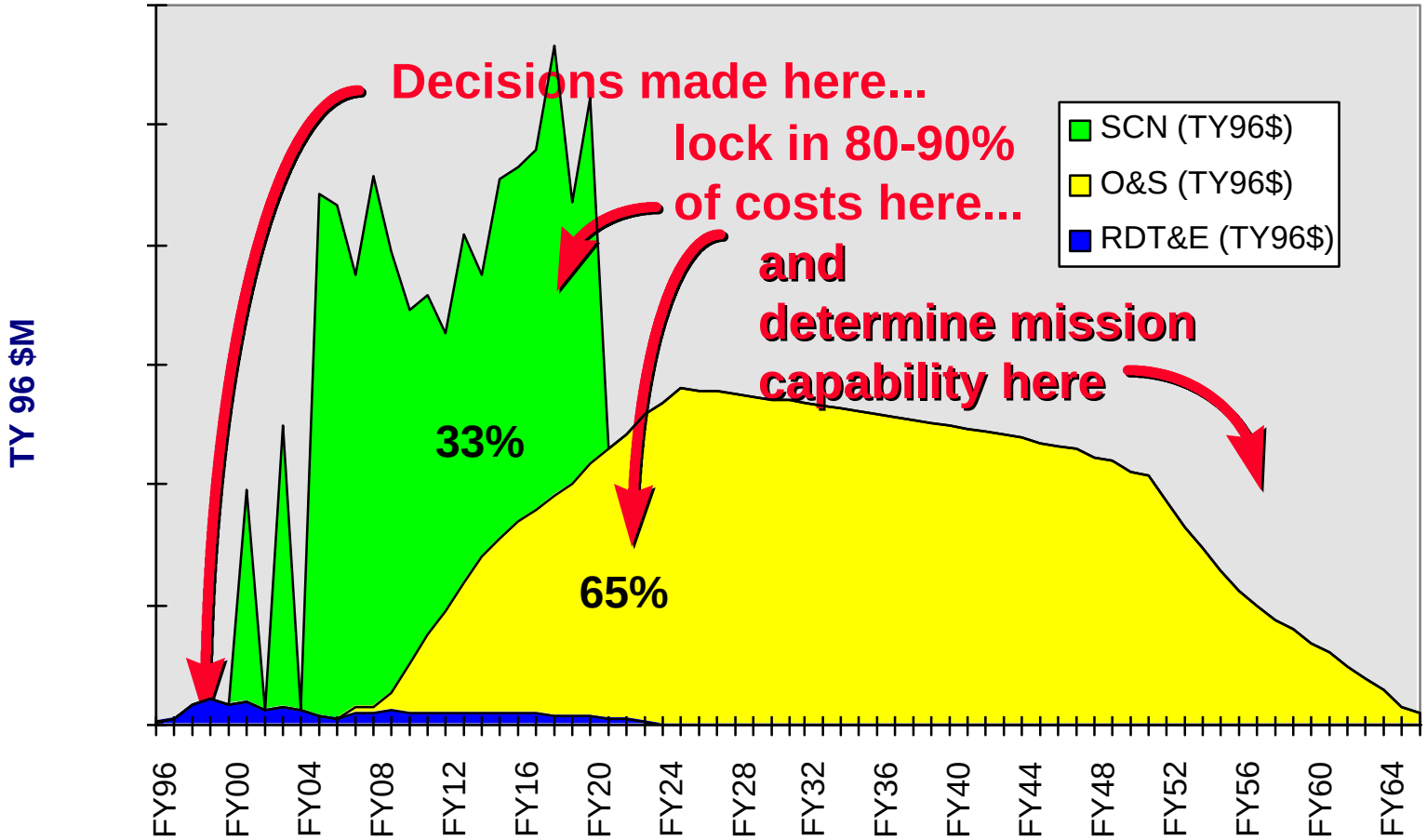
SC 21 MS I Documention

- Operational Requiments Document (ORD)
- Acquisition Program Baseline (APB)
- Test & Evaluation Master Plan (TEMP)
  - Vulnerability Assessment Report (VAR)
  - Live Fire Test and Evaluation (LFT&E) Report

SC 21 Master Schedule



Re-engineering the U.S. Navy



INVEST NOW FOR THE FUTURE !